MOUL

Witness: Moul
D.T.E. 03-40
Exhibit KEDNE/PRM-1

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

IN THE MATTER OF THE REVISION OF RATES

Filed by

BOSTON GAS COMPANY
D/B/A KEYSPAN ENERGY DELIVERY NEW ENGLAND

Case No. D.T.E. 03-40

Direct Testimony

of

Paul R. Moul
Managing Consultant
P. Moul & Associates

Concerning
Cost of Equity

**KeySpan Energy Delivery New England**

Direct Testimony of Paul R. Moul

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## INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

**Q. Please state your name, occupation and business address.**

A. My name is Paul Ronald Moul. My business address is 251 Hopkins Road, Haddonfield, New Jersey 08033-3062. I am Managing Consultant of the firm P. Moul & Associates, an independent, financial and regulatory consulting firm. My educational background, business experience and qualifications are provided in Appendix A that follows my direct testimony.

**Q. What is the purpose of your testimony?**

A. My testimony presents evidence, analysis and a recommendation concerning the appropriate rate of return on common equity that the Department of Telecommunications and Energy ("D.T.E." or the "Department") should establish for Boston Gas Company ("Boston Gas" or the "Company") in connection with the renewal of its performance-based ratemaking ("PBR") plan. My analysis and recommendation are supported by the detailed financial data contained in Exhibit KEDNE/PRM-2, which is a multi-page document that is divided into eleven (11) schedules. Additional evidence, in the form of appendices, follows my direct testimony. The items covered in these appendices deal with the technical aspects of my testimony.

**Q. Based upon your analysis, what is your conclusion concerning the appropriate rate of return on common equity for the Company?**

A. My conclusion is that the Company's rate of return on common equity should be 12.18%, and its overall rate of return should be 10.13%. As shown on Schedule 1, the calculation of the weighted average cost of capital, which serves as the basis of the overall rate of return, requires the selection of appropriate capital structure ratios and a determination of the appropriate cost rate for each capital component. The capital structure ratios and embedded cost of debt and preferred stock used to determine the overall rate of return are discussed in the testimony of Mr. Patrick J. McClellan, the Company's witness on cost of service. I agree with the capital structure ratios proposed by Mr. McClellan because they conform with the types of ratios that investors expect for a gas distribution utility and conform with the ratios that are expected by the credit rating agencies. Indeed, the Company's proposed common equity ratio is consistent with the proxy group of companies that I used to measure the cost of equity and with Boston Gas's historical equity ratio. The resulting overall rate of return, which is the product of weighting the individual capital costs by the proportion of each respective type of capital, establishes a compensatory level of return for the use of capital and provides the Company with the ability to attract capital.

**Q. What background information have you considered in the preparation of your testimony?**

A. The Company provides natural gas distribution service to approximately 555,000 sales and transportation customers in eastern and central

Massachusetts. In 2002, the Company's gas throughput (combined sales and transportation volumes) was represented by approximately 33% to residential customers, 16% to commercial and industrial customers, and 51% to transportation customers. While representing a large portion of gas throughput, commercial, industrial and transportation customers comprise only 9% of the Company's customers. This means that the energy needs of a few of the Company's customers could have a significant impact on the Company's operations.

The Company obtains its natural gas supply from various producers and marketers and has delivery arrangements with interstate pipeline companies. The Company supplements flowing natural gas with liquefied natural gas purchases and withdrawals from underground storage.

Boston Gas is an indirect wholly-owned subsidiary of KeySpan Corporation. KeySpan Corporation is a registered holding company under the Public Utility Holding Company Act of 1935 ("PUHCA") and operates six utilities that provide natural gas distribution service to about 2.5 million customers in New York City, Long Island, Massachusetts and New Hampshire. KeySpan Corporation also has electric operations on Long Island and other energy investments.

**Q. How have you determined the rate of return on common equity for the Company in this case?**

A. My rate of return on common equity is established using capital market and financial data relied upon by investors when assessing the relative risk, and hence, cost of equity for a gas distribution utility, such as Boston Gas. In this regard, I relied on four, well-recognized measures of the cost of equity: the Discounted Cash Flow ("DCF") model, the Risk Premium ("RP") analysis, the Capital Asset Pricing Model ("CAPM"), and the Comparable Earnings ("CE") approach. By considering the results of a variety of approaches, I determined a rate of return on common equity that is reasonable and consistent with the well-recognized principles for determining a fair rate of return. I measured the cost of equity for the Company using data from a proxy group of eight gas distribution companies that are identified on page 2 of Schedule 3. I will refer to my eight-company proxy group as the "Barometer Group" throughout my testimony.

I have not separately measured the cost of equity for the component companies of the Barometer Group, because the determination of the cost of equity for an individual company has become increasingly problematic. The restructuring of the utility industry has clouded the prospect for some companies, thereby making more tenuous a company-specific cost of equity determination. By employing group average data for the Barometer Group, rather than individual company analysis, I have helped minimize the effect of extraneous influences on the market data for an individual company.

**Q. Please summarize the basis for your cost of equity recommendation in this proceeding.**

A. My cost of equity determination was derived from the results of the methods/models identified above. In general, the use of more than one approach provides a superior foundation to arrive at the cost of equity. At any point in time, individual methods can provide an incomplete measure of the cost of equity depending upon extraneous factors that may influence market sentiment. The specific application of these methods/models will be described later in my testimony. The following table provides a summary of the indicated costs of equity using each of these approaches.

| | |
|---|---|
| DCF | 12.10% |
| RP | 12.25% |
| CAPM | 14.64% |
| CE | 13.90% |

The mean and median of these four methods is 13.22% and 13.08%, respectively. Focusing upon the market models of the cost of equity (i.e., DCF, Risk Premium and CAPM), the equity return averages to 13.00% (12.10% + 12.25% + 14.64% = 38.99% ÷ 3). The Department has previously recognized the usefulness of the DCF and Risk Premium measures when considering the cost of equity. These measures provide a cost of equity of 12.18% (12.10% + 12.25% = 24.35% ÷ 2). Given the Department's past evaluation of, and reliance on, these two market models for determining the cost of equity capital, I am recommending that the Company use a 12.18% rate of return on common equity to calculate its cost of service. I believe that this recommendation is a conservative estimate of the Company's cost of common equity and is near the lower end of the range of cost estimates produced by the four methods employed in my analysis. I also believe the 12.18% cost of equity recommendation is conservative because it makes no provision for the prospect that the rate of return may not be achieved due to unforeseen events that could occur during the effective period of the PBR plan. Therefore, a return on common equity of 12.18% is appropriate and reasonable in this case.

**Q. In your opinion, what factors should the Department consider when setting the Company's cost of capital in this proceeding?**

A. The Department should consider the ratesetting principles that I have set forth in Appendix B. The end result of the Department's rate of return allowance must provide a utility with the opportunity to cover its interest and dividend payments, provide a reasonable level of earnings retention, produce an adequate level of internally generated funds to meet capital requirements, be adequate to attract capital in all market conditions, be commensurate with the risk to which the utility's capital is exposed, and support reasonable credit quality.

## NATURAL GAS RISK FACTORS

**Q. Please identify some of the factors that make the natural gas industry different today from its past.**

A. Gas supply fundamentals have changed significantly as a result of the implementation of FERC Order Nos. 436, 500, and 636 which restructured the pipeline industry, and hence, gas supply fundamentals for natural gas distribution utilities, such as Boston Gas. The sweeping changes that have occurred through implementation of these changes have, among other things: eliminated the pipeline merchant function; completely unbundled the supply, transportation and storage functions provided by the interstate pipelines; fostered a pipeline rate design (i.e., straight fixed-variable, "SFV") that has decoupled revenues associated with the recovery of fixed costs from throughput, and required pipeline capacity reassignment. Further, implementation of SFV rate design has increased monthly demand charges payable to the interstate pipelines, which have increased rates to low load-factor customers such as residential customers. For a gas distribution utility, FERC Order No. 636 has moved the focus of gas supply from the city gate to the production field.

**Q. How have all these changes affected the natural gas utilities?**

A. The new competitive, regulatory and economic risks facing gas utilities are different today than formerly. Market-oriented pricing, open access for gas transportation, and changes in service agreements now taking place mean that natural gas utilities will be operating in a more complex environment with time frames for decision-making considerably shortened. The unbundling of rates and full customer choice exemplifies the changes taking place for gas utilities in Massachusetts. As the competitiveness of the natural gas business increases, the risk also increases. Natural gas continues to face significant competition from alternative energy sources. The Company faces direct competition from fuel oil dealers throughout its service territory. Moreover, the changes fostered by Order 636 have promoted competition among and between pipelines and distributors through bypass facilities. Bypass represents a threat to the Company, especially when electric generation customers are in close proximity to the interstate pipelines. With the availability of customer-owned transportation gas, along with delivery of uncertain volumes to dual-fuel customers, risk will continue to rise as large end users obtain for themselves the range of unbundled service offerings which are currently available from the interstate pipelines for the local distribution utilities.

Moreover, with the ongoing restructuring of the electric utility business, energy will be marketed increasingly on a BTU basis regardless of its form, further heightening the competitive pressure on the natural gas business. With increased interfuel competition and energy interchangeability, risk will continue to increase for gas companies during and after the restructuring of the electric utility business. Regulatory initiatives deregulating the price of power mean that retail electricity prices will be much more flexible than had been the case in the past. Moreover, heightened competition will undoubtedly develop from consolidation within the utility industry because mergers can result in lower costs for the survivors, which will allow them to become more aggressive competitors.

**Q. How have the bond rating agencies viewed the business risk facing the gas utilities?**

A. S&P has established a risk-adjusted or matrix approach to the financial benchmarks used to assess the credit quality of all regulated public utilities, including the gas distribution companies. For some time, S&P has applied a matrix approach which adjusts its financial benchmarks according to each company's business risk profile. That is to say, more lenient criteria are applied to companies with lower business risk, whereas more stringent criteria are applied to companies with higher business risk. In this regard, S&P has categorized each gas distribution company according to an assessment of its business risk. This risk evaluation has been expressed by business profile assignments that are intended to represent a specific level of business risk. Each regulated firm is assigned to a category on a scale of 1 (strong) to 10 (weak). In essence, business profile "1" equates to the lowest business risk, while business profile "10" equates to the highest business risk. In assigning a business profile, S&P has enumerated the key items it considers: regulation, markets, operations, competitiveness, and management.

According to S&P, the business profiles of the gas distribution industry range from "2" to "6." The average business profile for the gas distribution industry is "3." As shown on page 2 of Schedule 3, the average business profile assigned by S&P to the Barometer Group companies is also "3." Likewise, Boston Gas also has a "3" business profile assignment from S&P. These comparisons indicate that the business risk of Boston Gas is comparable to the average gas distribution utility and the Barometer Group.

**Q. What are some of the factors that impact the Company's business?**

A. Positive factors that influence the Company's business include:

- Low cost energy provider with high efficiency levels.
- Implementation of a more aggressive growth strategy.
- Relatively low saturation in the residential market using natural gas for space heating.
- Flexible rates for large volume customers.
- Commitment to high quality service exemplified by high levels of customer satisfaction.
- Affiliation with KeySpan.

As noted previously, the Company experiences direct competition from fuel oil as an energy source. Factors which heighten the Company's business risk include:

- Price competition of natural gas with fuel oil.
- Declining consumption per customer, unassociated with temperature.
- Urban service territory.
- A relatively old infrastructure which includes about 68% cast iron and unprotected steel mains.
- A relatively high construction program for non-revenue producing facilities.
- Use of special contracts to attract and maintain commercial and industrial customers.
- The risk implications of the PBR plan, which are described in the testimony presented by Mr. Bodanza.

**Q. How does the Company's throughput to commercial, industrial and transportation customers affect its risk profile?**

A. The Company's risk profile is influenced by natural gas sold/delivered to commercial, industrial and transportation customers. Sales and delivery to these high volume customers are usually thought to be of higher risk than sales to other customers. Success in this aspect of the Company's market is subject to the business cycle, the price of alternative energy sources, and pressures from the competitors noted above. Moreover, external factors can also influence the Company's throughput to these customers which face competitive pressure on their operations from facilities located outside the Company's service territory. The Company's service territory also includes high-tech companies which have recently seen a decline in their business prospects.

**Q. Are there other specific features of the Company's business that should be considered when assessing the Company's risk?**

A. Yes. About 70% the Company's residential customers use natural gas for space heating purposes. This statistic shows that a large proportion of the Company's residential customers present a low load factor profile. As noted previously, there is competition in the residential market from alternative energy sources, such as fuel oil. In addition, DTE policy has also changed with regard to the lost margins associated with demand side management programs.

**Q. Does the Company's proposal to implement a Weather Normalization Adjustment ("WNA") clause cause you to change your recommended cost of equity?**

A. No. Investors in a gas utility can only formulate reasonable expectations based upon normal weather, although achieved results may vary significantly from those expectations. That is to say, a rational investor in a gas utility can only anticipate normal temperature conditions, otherwise he or she would be a gambler. The financial theory upon which the cost of equity is based recognizes that investors value their investments on a long-term basis. For example, as I explain in my Exhibit KEDNE/PRM-3 at E-2, the DCF formula explicitly assumes a growth rate "approaching infinity." Weather, by definition, is normal over the long-term. Moreover, one of the standard models of the cost of equity (i.e., CAPM) suggests that there is no measurable effect on the cost of equity because weather represents a company-specific risk, which does not receive compensation in the CAPM. Therefore, the theories underlying my cost of capital testimony and those upon which the Department bases its cost of capital determination obviate the need for any adjustments based upon such short-term phenomena, such as weather variations which have no long-term effect. Therefore, over the long term, the investor required cost of capital or discount rate assumed for an investment in a gas utility would be the same either with or without a WNA. Furthermore, even if a WNA had an effect on an investor's required return on equity, my analysis already reflects some measure of the WNA using market-determined models. Five companies in my Barometer Group of eight companies already have some form of revenue stabilization mechanism. As such, the market prices of these companies reflect the expectations of investors related to a regulatory mechanism that adjust revenues for abnormal weather.[1]

Variations in weather affect customers' bills and the Company's cash flow. Utility customers are significantly affected by the effect of weather on their bills. Therefore, the operation of the WNA would directly benefit customers by stabilizing their bills when usage varies due to abnormal temperatures. Whereas the Company is able to hedge the abnormalities of the weather through use of financial instruments, it is unlikely that customers, particularly small commercial and residential customers, would engage in similar hedging activities. Through implementation of a WNA, the Company would be able to provide benefits to its customers, rather than enriching third-party financial institutions through hedging activities. Indeed, during periods of extremely low temperatures, personal comfort may outweigh price considerations of customers. In these circumstances, the operation of the WNA, which is essentially a billing issue, is directly beneficial to customers.

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[1] Even if it could be demonstrated that a WNA alters risk significantly, there is no basis to quantify a change in the cost of capital for any risk change.

**Q. Please indicate how the Company's risk profile is affected by its construction program.**

A. The Company is faced with the requirement to undertake investment to maintain and upgrade existing facilities in its service territory and to meet growth. To maintain safe and reliable service to existing customers, the Company must invest to upgrade its infrastructure. Although the Company has made significant strides in reducing its percentage of unprotected steel and cast iron pipe over the years, as of year-end 2001, they still comprise about 68% of its distribution mains.

The continuing cost of upgrading the Company's infrastructure will keep the level of construction expenditures at heightened levels. Over the next five years, the Company's capital expenditures are budgeted to be approximately \$496 million. These expenditures will represent an approximate 67% (\$496 million ÷ \$735 million) increase in net utility plant from the level at December 31, 2002. As previously noted, a fair rate of return for the Company represents a key to a financial profile that will provide the Company with the ability to raise the capital necessary to meet its capital needs on an ongoing basis. As shown by the construction expenditures indicated above, the regulatory process must establish a return on equity that provides a reasonable opportunity for the Company to actually achieve its cost of capital so that it can attract capital on reasonable terms.

## FUNDAMENTAL RISK ANALYSIS

**Q. Is it necessary to conduct a fundamental risk analysis to provide a framework for a determination of a utility's cost of equity?**

A. Yes. It is necessary to establish a company's relative risk position within its industry through a fundamental analysis of various quantitative and qualitative factors that bear upon investors' assessment of overall risk. The qualitative factors, which bear upon the Company's risk, have already been discussed. The quantitative risk analysis follows. The items that influence investors' evaluation of risk and their required returns are described in Appendix C. For this purpose, I have compared Boston Gas to the S&P Public Utilities, an industry-wide proxy consisting of various public utility endeavors, and the Barometer Group.

**Q. What are the components of the S&P Public Utilities?**

A. The S&P Public Utilities is a widely recognized index that is comprised of thirty-seven electric power and natural gas companies. These companies are identified on page 3 of Schedule 4. I have used this group as a broad-based measure of public utility endeavors.

**Q. What criteria have you employed to assemble your Barometer Group?**

A. The Barometer Group I have employed in this case includes companies that (i) are engaged in similar business lines, (ii) have publicly-traded common stock that is listed on the New York Stock Exchange, (iii) are contained in <u>The Value Line Investment Survey</u> in the industry group entitled "Natural

Gas Distribution," (iv) have operations in the Northeastern, Great Lakes and Southeastern regions of the U.S., (v) have not cut or omitted their dividend, (vi) have at least 70% of their assets represented by gas operations, and (vii) are not currently the target of a merger or acquisition.

**Q. Why have you imposed a selection criteria that includes a percentage of gas assets?**

A. In order to associate the cost of equity to the gas business, I have employed screening criteria that impose a limitation on the non-gas businesses of the proxy companies. In this regard, there are three principal financial variables that could be employed to measure the role of non-gas business of a firm. These are: revenues, operating income, and assets employed. I imposed a screening criteria whereby 70% of a company's assets must be devoted to the gas business for them to be included in the Barometer Group.

I did not use revenues for this purpose because the margins on other business segments are generally dissimilar to the gas distribution business. Energy-trading is a case in point, which would make revenue comparisons incompatible for this purpose.

I also did not use operating income for this purpose because of the margin issue discussed above. In addition, some non-regulated business segments may incur losses due to start-up, or other reasons, that can distort the percentage calculations.

I did use an asset screening criteria because it best describes the amount of capital that a firm devotes to each business segment. It is the potential return on that capital that represents the primary focus of investors when they value the securities of a firm.

The Barometer Group has the following percentage of its operations from the gas utility business: revenue 78%, income 96%, and identifiable assets 91%. These determinations were made to the extent that information was revealed in each company's 2001 annual report. Therefore, this Barometer Group provides a close match to the characteristics of a gas utility, such as Boston Gas.

**Q. Is knowledge of a utility's bond rating an important factor in assessing its risk and cost of capital?**

A. Yes. Knowledge of a company's credit quality rating is important because the cost of each type of capital is directly related to the associated risk of the firm. So while a company's credit quality risk is shown directly by the rating and yield on its bonds, these relative risk assessments also bear upon the cost of equity. This is because a firm's cost of equity is represented by its borrowing cost plus compensation to recognize the higher risk of an equity investment compared to debt.

**Q. How do the bond ratings compare for Boston Gas, the Barometer Group and the S&P Public Utilities?**

A. A public utility must have the financial strength to support its credit standing in order to fulfill its public service responsibilities. In this regard, the average corporate credit rating of the Barometer Group is A from S&P and an average A2 from Moody's. These credit quality ratings are equivalent to the Company's ratings, which are A from S&P and an A2 from Moody's. For the S&P Public Utilities, the average composite rating is BBB by S&P and Baa2 by Moody's. Many of the financial indicators that I will subsequently discuss are considered during the rating process.

**Q. What factors influence the bond ratings assigned by the credit rating agencies?**

A. The credit rating agencies consider various qualitative and quantitative factors in assigning grades of creditworthiness. The current S&P benchmark criteria replaced former criteria that were directed toward specific types of utilities. Now, each gas distribution company will be measured against a uniform set of financial benchmarks applicable to all firms that are assigned to a specific business profile. S&P has indicated that no rating changes should be expected from the new financial targets because they were developed by integrating prior financial benchmarks and historical industrial medians. The financial benchmarks for a utility with a "3" business profile include:

| Rating | Pre-Tax Interest Coverage | Debt Leverage | Funds from Operations Interest Coverage | Funds from Operations to Total Debt |
|---|---|---|---|---|
| AA | 4.0-3.4× | 42.0-47.5% | 4.5-3.9× | 31.5-26.0% |
| A | 3.4-2.8 | 47.5-53.0 | 3.9-3.1 | 26.0-20.0 |
| BBB | 2.8-1.8 | 53.0-61.0 | 3.1-2.1 | 20.0-14.0 |
| BB | 1.8-1.1 | 61.0-67.0 | 2.1-1.3 | 14.0-9.5 |
| B | 1.1-0.3 | 67.0-74.0 | 1.3-0.5 | 9.5-4.0 |

**Q. How do the financial data compare for Boston Gas, the Barometer Group, and the S&P Public Utilities?**

A. The broad categories of financial data that I will discuss are shown on Schedules 2, 3, and 4. With these data, my fundamental risk analysis has compared Boston Gas to the Barometer Group and the S&P Public Utilities using the years 1997 through 2001. For my analysis of Boston Gas, I have modified the Company's financial data from Standard & Poor's COMPUSTAT to remove the impact of merger-related items. For capital structure purposes, I removed the goodwill effect that was recorded in the Company's equity account, I removed the advance from KeySpan that represented the debt component of goodwill, and I also eliminated the gas inventory financing (an adjustment unrelated to the merger, but necessary for ratesetting purposes). Regarding the income statement, I removed the amortization of goodwill, merger related expenses, the interest expense on the merger-related advance, and associated income taxes. I will highlight the important categories of relative risk as follows:

Size. In terms of capitalization, Boston Gas is less than one-half the size of the Barometer Group. The S&P Public Utilities are many times larger than Boston Gas and the Barometer Group. All other things being equal, a smaller company is riskier than a larger company because a given change in revenue and expense has a proportionately greater impact on a small firm. As I will demonstrate later, the size of a firm can impact its cost of equity. This is the case for the Barometer Group.

Market Ratios. Market-based financial ratios, such as earnings/price ratios and dividend yields, provide a partial measure of the investor-required cost of equity. If all other factors are equal, investors will require a higher return on equity for companies that exhibit greater risk as compensation for that risk. That is to say, a firm that investors perceive to have higher risks will experience a lower price per share in relation to expected earnings; a high earnings/price ratio is thus indicative of greater risk.[2]

There are no market ratios available for Boston Gas. The average earnings/price ratio was similar for the Barometer Group and the S&P Public Utilities. The average dividend yield was somewhat higher for the Barometer Group than for the S&P Public Utilities. On average, the historical market-to-book ratio was somewhat higher for the S&P Public Utilities as compared

[2] For example, two otherwise similarly situated firms each reporting $1.00 earnings per share would have different market prices at varying levels of risk, i.e., the firm with a higher level of risk will have a lower share value, while the firm with a lower risk profile will have a higher share value.

to the Barometer Group. I will subsequently discuss the cost of equity implications of market-to-book ratios.

Common Equity Ratio. The level of financial risk is measured by the proportion of long-term debt and other senior capital that is contained in a company's capitalization. Financial risk is also analyzed by comparing common equity ratios (the complement of the ratio of debt and other senior capital). That is to say, a firm with a high common equity ratio has low financial risk, while a firm with a low common equity ratio has high financial risk. The five-year average common equity ratios, based on permanent capital, were 50.6% for Boston Gas, 51.3% for the Barometer Group, and 40.6% for the S&P Public Utilities. This shows that the financial risk is fairly similar for Boston Gas and the Barometer Group.

Return on Book Equity. Greater variability (i.e., uncertainty) of a firm's earned returns signifies relative levels of risk, as shown by the coefficient of variation (standard deviation ÷ mean) of the rate of return on book common equity. The higher the coefficient of variation, the greater degree of variability. For the five-year period, the coefficients of variation were 0.246 (3.0% ÷ 12.2%) for Boston Gas, 0.079 (1.0% ÷ 12.6%) for the Barometer Group, and 0.162 (1.9% ÷ 11.7%) for the S&P Public Utilities. The higher variation of the Company's earnings indicates somewhat greater risk for the Company as compared to the Barometer Group. Further, the

12.2% five year average earned return is a factor that investors would be mindful of and help set their expectations for the Company.

Operating Ratios. I have also compared operating ratios (the percentage of revenues consumed by operating expense, depreciation and taxes other than income)[3]. The five-year average operating ratios were 88.9% for Boston Gas, 87.5% for the Barometer Group, and 83.5% for the S&P Public Utilities. The operating ratios were fairly similar for Boston Gas and the Barometer Group.

Coverage. The level of fixed charge coverage (i.e., the multiple by which available earnings cover fixed charges, such as interest expense and preferred stock dividends) provides an indication of the earnings protection for creditors. Higher levels of coverage, and hence earnings protection for fixed charges, are usually associated with superior grades of creditworthiness. The five-year average pre-tax interest coverage (excluding AFUDC) was 4.03 times for Boston Gas, 3.63 times for the Barometer Group, and 2.93 times for the S&P Public Utilities. The credit risk of Boston Gas is lower than that of the Barometer Group.

Quality of Earnings. Measures of earnings quality are usually revealed by the percentage of Allowance for Funds Used During Construction ("AFUDC") related to income available for common equity, the

[3] The complement of the operating ratio is the operating margin which provides a measure of profitability. The higher the operating ratio, the lower the operating margin.

effective income tax rate, and other cost deferrals. These measures of earnings quality usually influence a firm's internally generated funds because poor quality of earnings would not generate high levels of cash flow. Quality of earnings has not been a significant concern for Boston Gas, the Barometer Group, and the S&P Utilities in recent years.

Internally Generated Funds. Internally generated funds ("IGF") provide an important source of new investment capital for a utility and represent a key measure of credit strength. Historically, the five-year average percentage of IGF to capital expenditures was 82.0% for Boston Gas, 82.3% for the Barometer Group, and 106.7% for the S&P Public Utilities. The average IGF percentages were similar for Boston Gas and the Barometer Group.

Betas. The financial data I have been discussing relate primarily to company-specific risks. Market risk for firms with traded stock is measured by beta coefficients. Beta coefficients attempt to identify systematic risk, i.e., the risk associated with changes in the overall market for common equities. Value Line publishes such a statistical measure of a stock's relative historical volatility to the rest of the market. A comparison of market risk is shown by the betas provided on page 2 of Schedule 3 -- .68 for the Barometer Group and page 3 of Schedule 4 -- -.96 average beta for the S&P Public Utilities. Keeping in mind that the utility industry has changed significantly during the past several years, the systematic risk percentage was 71% (.68 ÷ .96) for the

Barometer Group using the S&P Public Utilities' average beta as a benchmark.

**Q. Please summarize your risk evaluation of the Company and the Barometer Group.**

A. The risk of Boston Gas parallels that of the Barometer Group in a variety of respects. However, in one important aspect, related to its more variable earned returns, the Company's risk is higher than that of the Barometer Group. In the categories of financial risk, operating ratios, quality of earnings and IGF to construction, the Company is similar to the Barometer Group. On balance, the Barometer Group provides a reasonable basis for measuring the Company's cost of equity. The cost of equity derived from the Barometer Group is directly applicable to Boston Gas.

## COST OF EQUITY DETERMINATION

**Q. Please describe the process you employed to determine the cost of equity for the Company.**

A. Although my fundamental financial analysis provides the required framework to establish the risk relationships among Boston Gas, the Barometer Group, and the S&P Public Utilities, the cost of equity must be measured by standard financial models that I describe in Appendix D. Differences in risk traits, such as size, business diversification, geographical diversity, regulatory policy, financial leverage, and bond ratings must be considered when analyzing the cost of equity.

It is also important to reiterate that no one method or model of the cost of equity can be applied in an isolated manner. Rather, informed judgment must be used to take into consideration the relative risk traits of the firm in order to arrive at the appropriate cost of equity within the parameters of the results of these models. It is for this reason that I have used more than one method to measure the Company's cost of equity. As noted in Appendix D, and elsewhere in my direct testimony, each of the methods used to measure the cost of equity contains certain incomplete and/or overly restrictive assumptions and constraints that are not optimal. Therefore, I favor considering the results from a variety of methods. In this regard, I have applied each of these methods with data taken from the Barometer Group and have arrived at a cost of equity of 12.18% for Boston Gas.

## DISCOUNTED CASH FLOW ANALYSIS

**Q. Please describe your use of the Discounted Cash Flow approach to determine the cost of equity.**

A. The details of my use of the DCF approach and the calculations and evidence in support of my conclusions are set forth in Appendix E. I will summarize them here. The Discounted Cash Flow ("DCF") model seeks to explain the value of an asset as the present value of future expected cash flows discounted at the appropriate risk-adjusted rate of return. In its simplest form, the DCF return on common stocks consists of a current cash (dividend) yield and future price appreciation (growth) of the investment. The cost of equity based on a combination of these two components represents the total return that investors can expect with regard to an equity investment.

Among other limitations of the model, there is a certain element of circularity in the DCF method when applied in rate cases. This is because investors' expectations for the future depend upon regulatory decisions. In turn, when regulators depend upon the DCF model to set the cost of equity, they rely upon investor expectations that include an assessment of how regulators will decide rate cases. Due to this circularity, the DCF model may not fully reflect the true risk of a utility.

As I describe in Appendix E, the DCF approach also has certain limitations that diminish its usefulness in the ratesetting process when stock prices diverge significantly from book values. When stock prices diverge from book values by a significant margin, the DCF method will lead to a misspecified cost of equity.

If regulators rely upon the results of the DCF (which are based on the market price of the stock of the companies analyzed) and apply those results to a net original cost (book value) rate base, the resulting earnings will not produce the level of required return specified by the model when market prices vary from book value. That is to say, such distortions tend to produce DCF results that understate the cost of equity to regulated firms when using a book value rate base. Although not recognized by the Department to this point, this shortcoming of the DCF has persuaded one regulatory agency to adjust the cost of equity upward to make the return consistent with the book value capital structure (Pennsylvania Public Utility Commission v. Pennsylvania-American Water Co., R-00016339, January 25, 2002 and Pennsylvania Public Utility Commission v. Philadelphia Suburban Water Company, R-00016750, August 1, 2002). As I will explain later in my testimony, the DCF model can be modified to account for differences in risk attributed to changes in financial leverage when market prices and book values diverge.

**Q. Please explain the dividend yield component of the DCF analysis.**

A. The DCF methodology requires the use of an expected dividend yield to establish the investor-required cost of equity. For the twelve months ended December 2002, the monthly dividend yields for the Barometer Group are shown graphically on Schedule 5. The monthly dividend yields shown on Schedule 5 include an adjustment to the month-end prices to reflect the build up of the dividend in the price that has occurred since the last ex-dividend date (i.e., the date by which a shareholder must own the shares to be entitled to the dividend payment--usually about two to three weeks prior to the actual payment). An explanation of this adjustment is provided in Appendix E.

For the twelve months ended December 2002, the average dividend yield was 4.90% for the Barometer Group based upon a calculation using annualized dividend payments and adjusted month-end stock prices. The dividend yields for the more recent six- and three-month periods were 5.11%

and 5.01%, respectively, for the Barometer Group. I have used, for the purpose of my direct testimony, a dividend yield of 5.11% for the Barometer Group which represents the six-month average yield. The use of this dividend yield will reflect current capital costs while avoiding spot yields.

For the purpose of a DCF calculation, the average dividend yield must be adjusted to reflect the prospective nature of the dividend payments, i.e., the higher expected dividends for the future. Recall that the DCF is an expectational model that must reflect investor anticipated future cash flows for the Barometer Group. I have adjusted the six-month average dividend yield in three different but generally acceptable manners, and used the average of the three adjusted values as calculated in Appendix E. The adjusted dividend yield is 5.28% for the Barometer Group.

**Q. What investor-expected growth rate is appropriate in a DCF calculation?**

A. Although some DCF devotees would advocate that mathematical precision should be followed when selecting a growth rate (i.e., precise input variables often considered within the confines of retention growth), the fact is that investors, when establishing the market prices for a firm, do not behave in the same manner assumed by the constant growth rate models using accounting values. Rather, investors consider both company-specific variables and overall market sentiment (i.e., level of inflation rates, interest rates, economic conditions, etc.) when balancing their capital gains expectations with their dividend yield requirements. I followed an approach that is not rigidly formatted because investors are not influenced by a single set of company-specific variables weighted in a formulaic manner. Therefore, in my opinion, all relevant growth rate indicators using a variety of techniques should be evaluated when formulating a judgment of investor expected growth.

**Q. What data have you considered in your growth rate analysis?**

A. I have considered the growth in the financial variables shown on Schedules 6 and 7. The bar graph provided on Schedule 6 shows the historical growth rates in earnings per share, dividends per share, book value per share, and cash flow per share for the Barometer Group. The historical growth rates were taken from the Value Line publication that provides these data. As shown on Schedule 6, the historical earnings per share growth rates were 3.56% and 3.81% for the Barometer Group. The historical growth rates in earnings per share contain instances of negative values for individual companies within the Barometer Group. Although indications of negative growth should not be factored into a DCF analysis for reasons stated below, both positive and negative growth rates have been included in the average for the Barometer Group. Obviously, negative growth rates provide no reliable guide to gauge investor expected growth for the future. Negative growth would be reflective of a cyclical pattern of earnings, not the long-term trend that reflects positive earnings growth. Investor expectations always encompass long-term positive growth rates and, as such, could not be represented by sustainable negative rates of change. Therefore, statistics that include negative growth rates should not be given any weight when formulating a composite investors' growth expectation for the future. The prospect of rate increases granted by regulators, the continued obligation to provide service as required by customers and the ongoing growth of customers mandate investor expectations of positive future growth rates. Stated simply, there is no reason for investors to expect that a utility will wind up its business and distribute its common equity capital to shareholders, which would be symptomatic of a long-term permanent earnings decline. Although investors have knowledge that negative growth and losses can occur, their expectations always include positive growth. Negative values will not provide a reasonable representation of future growth expectations, because, in the long run, investors will always expect positive growth. Indeed, rational investors always expect positive returns, otherwise they will hold cash rather than invest with the expectation of a loss.

Schedule 7 shows projected earnings per share growth rates taken from analysts' forecasts provided in IBES, Zacks, First Call, Market Guide and the Value Line publications. IBES, Zacks, First Call and Market Guide represent reliable authorities of projected growth upon which investors rely. The IBES, Zacks, First Call and Market Guide forecasts are limited to earnings per share growth, while Value Line makes projections of other financial variables. The Value Line forecasts of dividends per share, book value per share, and cash flow per share have also been included on Schedule 7 for the Barometer Group.

**Q. What specific evidence have you considered in the DCF growth analysis?**

A. As to five-year forecast growth rates, Schedule 7 indicates that the projected earnings per share growth rates for the Barometer Group are 5.75% by IBES, 5.88% by Zacks, 5.60% by First Call, 5.39% by Market Guide and 7.44% by Value Line. The Value Line projections indicate that earnings per share will grow prospectively at a more rapid rate (i.e., 7.44%) than dividends per share (i.e., 2.57%), which indicates a declining payout ratio in the future. As indicated earlier, and in Appendix E, with the constant price-earnings multiple assumption of the DCF model, growth for these companies will occur at the higher earnings per share, thus producing the capital gains yield expected by investors.

**Q. Is a five-year investment horizon associated with the analysts' forecasts consistent with the DCF model?**

A. Yes. In fact, it illustrates one unrealistic assumption of how to view the infinite form of the model. Rather than viewing the DCF in the context of an endless stream of growing dividends (e.g., a century of cash flows), the growth in the share value (i.e., capital appreciation, or capital gains yield) is most relevant to investors' total return expectations. Along these lines, forecasts that encompass growth for the next five years provide the best available information that influences investor expected returns. Hence, the sale price of a stock can be viewed as a liquidating dividend that can be discounted along with the annual dividend receipts during the investment-holding period to arrive at the investor expected return. The growth in the price per share will equal the growth in earnings per share absent any change in price-earnings (P-E) multiple -- a necessary assumption of the DCF. As such, my DCF analysis, which relies principally upon five-year forecasts of earnings per share growth, conforms to the type of analysis that influences the total return expectation of investors.

Q. **What conclusion have you drawn from these data?**

A. Earnings per share projections by financial analysts represent the growth indicators most indicative of investor expected growth for a firm. In particular, the massive restructuring of the utility industry through deregulation, unbundling, and merger and acquisition ("M&A") activity suggests that historical evidence does not presently represent a good measure of growth for these companies. Projections of future earnings growth provide the best available information to evaluate. In this regard, it is worthwhile to note that Professor Myron Gordon, the foremost proponent of the DCF model in rate cases, established that the best measure of growth in the DCF model is forecasts of earnings per share growth.[4] Hence, to follow Professor Gordon's findings, projections of earnings per share growth, such as those published by

4 "Choice Among Methods of Estimating Share Yield," The Journal of Portfolio Management, spring 1989 by Gordon, Gordon & Gould.

IBES, Zacks, First Call, Market Guide, and Value Line, represents a reasonable assessment of investor expectations.

It is appropriate to consider all forecasts of earnings growth rates that are available to investors. In this regard, I have considered the forecasts from IBES, Zacks, First Call, Market Guide and Value Line. The IBES, Zacks, First Call, and Market Guide growth rates are consensus forecasts taken from a survey of analysts that make projections of growth for these companies. The Zacks, First Call, and Market Guide estimates are obtained from the Internet and are widely available to investors free-of-charge. First Call is probably quoted most frequently in the financial press when reporting on earnings forecasts. The Value Line forecasts are also widely available to investors and can be obtained by subscription or free-of-charge at most public and collegiate libraries.

For the Barometer Group, the forecasts of earnings per share data as shown on Schedule 7 support my opinion that a prospective growth rate of 6.00% represents a reasonable expectation. While the DCF growth rate cannot be established solely with a mathematical formulation, it is within the array of earnings per share growth rates shown by the analysts' forecasts. Further, the Value Line forecasts of cash flow per share and retention growth support my 6.00% DCF growth rate. The Value Line forecast of dividend per share growth is inadequate in this regard due to the forecast decline in payout ratio that I previously described.

Moreover, the restructuring and consolidation now taking place in the utility industry will provide additional risks and opportunities (both regulated and non-regulated) as the utility industry successfully adapts to the new business environment. Changes in fundamentals that will enhance the growth prospects for the future will undoubtedly develop beyond the next five years typically considered in the analysts' forecasts. And, expectations concerning M&A activities also impact stock prices. M&A premiums have the effect of raising prices, and therefore reducing observed dividend yields, without necessarily showing up in higher long-term growth rate forecasts. In that case, the traditional DCF calculation would understate the required cost of equity.

**Q. In previous rate cases, the Department has been presented with two arguments concerning the reasonableness for the DCF growth rate. Please comment.**

A. In prior cases, the Department has been asked to consider the DCF growth rate in the context of historical growth and the forecast growth in the gross domestic product ("GDP"). In my opinion, neither of these considerations are warranted in order to establish the reasonableness of the DCF growth rate.

First, historical growth rates have been shown to be empirically inadequate for DCF purposes as documented by the Gordon article. In addition, the significant divergence of future fundamentals from the past suggests that forecasts be given primary emphasis for reasons previously explain. Moreover, giving specific weight to historical growth essentially double counts these growth rates. This is because securities' analysts make their earnings growth estimates after conducting an historical analysis. During this period of change, securities analysts will incorporate the new risks and opportunities that will develop in the future when they make forecasts that begin with an historical analysis. IBES, Zacks, First Call, Market Guide, and Value Line together provide the most comprehensive consensus of financial analysts and the information most available to and relied upon by investors. The very fact that these analysts have access to historical data and consider these, along with other relevant factors, signifies the inappropriateness of relying on the historical data. And to the extent historical information is relevant, it is already reflected in the financial analysts' projections.

As to the issue of GDP growth, there is inadequate foundation for the selection of the GDP to represent the long-term growth in the DCF. In the first instance, GDP growth figures are well known to financial analysts, and their projections already incorporate economy-wide measures to the extent they affect an individual firm. Secondly, it can be shown empirically that GDP growth has not set a limit on long-term growth, nor is it expected to in the future. It must be recognized that the GDP has a "product side" and "income side" components. The product side of the GDP is comprised of: (i) personal consumption expenditures; (ii) gross private domestic investment;

(iii) net exports of goods and services; and (iv) government consumption expenditures and gross investment. On the income side, the components are: (i) compensation of employees; (ii) proprietors' income; (iii) rental income; (iv) corporate profits; and (v) net interest, all of which comprise National Income. To National Income is added business transfer payments, indirect business taxes, consumption of fixed capital, net receipts/payment to the rest of the world, and a statistical discrepancy. The result then equals GDP.

If the "product side," (i.e., demand components) is to be used in a long-term growth analysis, then the GDP growth should be a representation of revenue growth, not earnings growth. It is well known that revenue growth does not necessarily equal earnings growth. The earnings growth rates for corporations will be substantially affected by changes in operating expenses and capital costs. There is no basis to assume that the same growth rate would apply to revenues and all components of costs. Hence, from an earnings growth perspective, growth in corporate profits taken from the National Income accounts would correctly reflect long-term growth in the DCF.

**Q. Have you analyzed long-term growth in corporate profits as compared to GDP growth?**

A. Yes. Twice annually, Blue Chip Economic Indicators provides long-range consensus forecasts. Based upon the October 10, 2002 issue of Blue Chip, those forecasts are:

| Year | Nominal GDP | Corporate Profits, Pretax |
|---|---|---|
| 2004 | 5.5% | 8.8% |
| 2005 | 5.4 | 7.4 |
| 2006 | 5.3 | 6.5 |
| 2007 | 5.3 | 6.4 |
| 2008 | 5.2 | 5.9 |
| 2004-2008 average | 5.3 | 7.0 |
| 2009-2013 average | 5.4 | 6.3 |

It is also indicated historically that the percentage change in Corporate Profits has been higher than the percentage change in GDP[5].

As explained above, GDP is a measure of demand which would represent growth in revenues, not corporate profits. Corporate Profits will grow at a more rapid rate than GDP. From these data, growth in Corporate Profits for the long run support a DCF growth rate higher than GDP growth.

**Q. Does growth in either GDP or corporate profits account for the specific growth fundamentals of a company?**

A. No. Such an approach provides a generic measure of growth, which does not recognize that a firm's management can skillfully produce profits that exceed some generic benchmark. Indeed, it is the goal of all corporate managers to increase shareholder wealth, which is accomplished through increased profits.

**Q. At this point, what is the sum of the dividend yield and growth rate?**

[5] Since 1929, after excluding corporate losses during the Great Depression.

A. Although this summation would not provide a complete representation of the rate of return on common equity for ratesetting purposes, the dividend yield and growth rate would provide the return shown below for the Barometer Group:

$$D_1/P_0 \quad + \quad g \quad = \quad k$$

$$5.28\% \; + \; 6.00\% \; = \; 11.28\%$$

**Q. Please explain why the 11.28% DCF return does not provide a complete representation of the cost of equity?**

A. As noted previously and as demonstrated in Appendix E, the divergence of stock prices from book values creates a conflict when the results of a market-derived cost of equity are applied to the common equity account measured at book value in ratesetting context. This is the situation today where the market price of stock exceeds its book value for most utilities. This divergence of price and book value also creates a financial risk difference, whereby the capitalization of a utility measured at its market value contains relatively less debt and more equity than the capitalization measured at its book value.

**Q. What are the implications of a DCF derived return that is related to market value when the results are applied to the book value of a utility's capitalization?**

A. The capital structure ratios measured at their book value show more financial leverage, and hence higher risk, than the capitalization measured at their market values. Please refer to Appendix E for the comparison. This means that a market-derived cost of equity, using models such as DCF and CAPM, reflects a level of financial risk that is different from that shown by the book value capitalization. Hence, it is necessary to adjust the market-determined cost of equity upward to reflect the higher financial risk related to the book value capitalization used for ratesetting purposes. Failure to make this modification would result in a mismatch of the lower financial risk related to market value used to measure the cost of equity and the higher financial risk of the book value capital structure used in the ratesetting process. Because the ratesetting process utilizes the book value capitalization, it is necessary to adjust the market-determined cost of equity for the higher financial risk related to the book value of the capitalization.

**Q. How is the DCF-determined cost of equity adjusted for the financial risk associated with the book value of the capitalization?**

A. In pioneering work, Nobel laureates Modigliani and Miller developed several theories about the role of leverage in a firm's capital structure. As part of that work, Modigliani and Miller established that as the borrowing of a firm increases, the expected return on stockholders' equity also increases. This principle is incorporated into my leverage adjustment which recognizes that the expected return on equity increases to reflect the increased risk associated with the higher financial leverage shown by the book value capital structure, as compared to the market value capital structure that contains lower financial risk. Modigliani and Miller proposed several approaches to quantify the equity return associated with various degrees of debt leverage in a firm's capital structure. These formulas point toward an increase in the equity return associated with the higher financial risk of the book value capital structure. As detailed in Appendix E, the Modigliani and Miller theory shows that the cost of equity increases by 0.82% (12.10% - 11.28%) when the book value of equity rather than the market value of equity, is used for ratesetting purposes.

**Q. Please provide the DCF return based upon your preceding discussion of dividend yield, growth, and leverage.**

A. As previously explained, I have utilized a six-month average dividend yield ("$D_1/P_0$") adjusted in a forward-looking manner for my DCF calculation. This dividend yield is used in conjunction with the growth rate ("$g$") previously developed. The DCF also includes the leverage modification ("*lev.*") to recognize that the book value equity ratio is used in the ratesetting process rather than the market value equity ratio related to the price of stock. The resulting DCF cost rate is:

$$D_1/P_0 \quad + \quad g \quad + \quad lev. \quad = \quad k$$

$$5.28\% \; + \; 6.00\% \; + \; 0.82\% \; = 12.10\%$$

The DCF result shown above represents the simplified (i.e., Gordon) form of the model that contains a constant growth assumption. I should reiterate, however, that the DCF indicated cost rate provides an explanation of the rate of return on common stock market prices without regard to the prospect of a change in the price-earnings multiples. Indeed, price-earnings multiples change frequently, especially in a more volatile equity market.

## RISK PREMIUM ANALYSIS

**Q. Please describe your use of the Risk Premium approach to determine the cost of equity.**

A. The details of my use of the Risk Premium approach and the evidence in support of my conclusions are set forth in Appendix G. I will summarize them here. With this method, the cost of equity capital is determined by reference to corporate bond yields plus a premium to account for the fact that common equity is exposed to greater investment risk than debt capital.

**Q. What long-term public utility debt cost rate did you use in your risk premium analysis?**

A. In my opinion, a 7.25% yield represents a reasonable estimate of the prospective yield long-term A-rated public utility bonds. As I will subsequently show, the Moody's index and the Blue Chip forecasts support this figure.

The historical yields for long-term public utility debt are shown graphically on page 1 of Schedule 8. For the twelve months ended December 2002, the average monthly yield on Moody's A-rated index of public utility bonds was 7.37%. For the six- and three-month periods ending December 2002, the yields were 7.17% and 7.15%, respectively.

I have determined the forecast yields on A-rated public utility debt by using the Blue Chip Financial Forecasts ("Blue Chip") along with the spread in yields that I describe in Appendix F. The Blue Chip Financial Forecasts is a reliable authority and contains consensus forecasts of a variety of interest rates compiled from a panel of banking, brokerage, and investment advisory services. In early 1999, Blue Chip stopped publishing forecasts of yields on A-rated public utility bonds because the Federal Reserve deleted these yields from its Statistical Release H.15. To independently project the forecast of the yields on A-rated public utility bonds, I have combined the forecast yields on long-term Treasury bonds published on January 1, 2003 and the yield spread of 2.00% that I describe in Appendix F. For comparative purposes, I have also shown the Blue Chip Financial Forecasts yields on Aaa-rated and Baa-rated corporate bonds. These forecasts are:

| | Blue Chip Financial Forecasts | | | | |
|---|---|---|---|---|---|
| | Corporate bonds | | Long-term | A-rated Utility | |
| Quarter | Aaa rated | Baa rated | Average | Spread | Yield |
| 1st Qtr. 2003 | 6.3% | 7.5% | 5.1% | 2.0% | 7.1% |
| 2nd Qtr. 2003 | 6.3 | 7.5 | 5.2 | 2.0 | 7.2 |
| 3rd Qtr. 2003 | 6.4 | 7.6 | 5.3 | 2.0 | 7.3 |
| 4th Qtr. 2003 | 6.6 | 7.7 | 5.6 | 2.0 | 7.6 |
| 1st Qtr. 2004 | 6.8 | 7.8 | 5.7 | 2.0 | 7.7 |
| 2nd Qtr. 2004 | 6.9 | 8.0 | 5.8 | 2.0 | 7.8 |

Given these forecasts and the historical long-term interest rates, a 7.25% yield on A rated public utility bonds represents a reasonable expectation.

**Q. What equity risk premium have you determined for public utilities?**

A. Appendix G provides a discussion of the financial returns that I relied upon to develop the appropriate equity risk premium for the S&P Public Utilities. I have calculated the equity risk premium by comparing the market returns on utility stocks and the market returns on utility bonds. I chose the S&P Public Utility index for the purpose of measuring the market returns for utility stocks because it is intended to represent firms engaged in regulated activities and today is comprised of electric companies and gas companies. The S&P Public Utility index contains companies that are more closely aligned with these groups than some broader market index, such as the S&P 500 Composite index. The S&P Public Utility index is a subset of the overall S&P 500 Composite index. Use of the S&P Public Utility index reduces the role of judgment in establishing the risk premium for public utilities. With the equity risk premiums developed for the S&P Public Utilities as a base, I derived the equity risk premium for the Barometer Group.

**Q. What equity risk premium for the S&P Public Utilities have you determined for this case?**

A. To develop an appropriate risk premium, I analyzed the results for the S&P Public Utilities by averaging (i) the midpoint of the range shown by the geometric mean and median and (ii) the arithmetic mean. This procedure has been employed to provide a comprehensive way of measuring the central tendency of the historical returns. As shown by the values indicated on page 2 of Schedule 9, the indicated risk premiums for the various time periods analyzed are 5.16% (1928-2001), 5.96% (1952-2001), 5.24% (1974-2001), and 5.39% (1979-2001). The selection of the shorter periods from the entire historical series is designed to provide a risk premium that conforms more nearly to present investment fundamentals and removes some of the more distant data from the analysis.

**Q. Do you have further support for the selection of time periods used in your equity risk premium determination?**

A. Yes. First, the terminal year of my analysis presented in Schedule 9 represents the most recent calendar year of data which is available at the time this testimony was prepared. Hence, all historical periods include data through 2001. Second, the selection of the initial year of each period was based upon the events that I describe in Appendix G. These events were fixed in history and cannot be manipulated as later financial data becomes available. That is to say, using the Treasury-Federal Reserve Accord as a defining event, the year 1952 is fixed as the beginning point for the measurement period regardless of the financial results that subsequently occurred. Likewise, 1974 represented a benchmark year because it followed the 1973 Arab Oil embargo. Also, the year 1979 was chosen because it began the deregulation of the financial markets. As such, additional data is merely added to the earlier results when it becomes available, clearly showing that the periods chosen were not driven by the desired results of the study.

**Q. What conclusions have you drawn from these data?**

A. Using the summary values provided on page 2 of Schedule 9, the 1928-2001 period provides the lowest indicated risk premium, while the 1952-2001 period provides the highest risk premium for the S&P Public Utilities. Within these bounds, a common equity risk premium of 5.32% (5.24% + 5.39% = 10.63% ÷ 2) is shown from the data covering the periods 1974-2001 and 1979-2001, which represents the more recent results. Therefore, 5.32% represents a reasonable risk premium for the S&P Public Utilities in this case.

As noted earlier in my fundamental risk analysis, differences in risk characteristics must be taken into account when applying the results for the S&P Public Utilities to the Barometer Group. I recognized these differences in the development of the equity risk premium in this case. I previously enumerated various differences in fundamentals between the Barometer Group and the S&P Public Utilities, including size, market ratios, common equity ratio, return on book equity, operating ratios, coverage, quality of earnings, internally generated funds, and betas. In my opinion, these differences indicate that 5.00% represents a reasonable common equity risk premium for this case. This represents approximately 94% (5.00% ÷ 5.32% = .94) of the risk premium of the S&P Public Utilities and is reflective of the risk of the Barometer Group compared with that of the S&P Public Utilities.

**Q. What common equity cost rate would be appropriate using this equity risk premium and the yield on long-term public utility debt?**

A. The cost of equity (i.e., "$k$") is represented by the sum of the prospective yield for long-term public utility debt (i.e., "$i$") and the equity risk premium (i.e., "$RP$"). The Risk Premium approach provides a cost of equity of:

$$i \quad + \quad RP \quad = \quad k$$

$$7.25\% \quad + \quad 5.00\% \quad = \quad 12.25\%$$

## CAPITAL ASSET PRICING MODEL

**Q. How have you used the Capital Asset Pricing Model to measure the cost of equity in this case?**

A. I have used the Capital Asset Pricing Model ("CAPM") in addition to my other methods. As with other models of the cost of equity, the CAPM contains a variety of assumptions, as I discuss in Appendix H. Therefore, this method should be used to complement the results of other methods to measure the cost of equity as each will complement the other and will provide a result that will alleviate the unavoidable shortcomings found in each method.

**Q. What are the features of the CAPM as you have used it?**

A. The CAPM uses a yield on a risk-free interest bearing obligation plus a return representing a premium that is proportional to the systematic risk of an investment. The details of my use of the CAPM and evidence in support of my conclusions are set forth in Appendix H. To compute the cost of equity with the CAPM, three components are necessary, i.e., a risk-free rate of return ("$Rf$"), the beta measure of systematic risk ("$\beta$"), and the market risk premium ("*Rm* - *Rf*") derived from the total return on the market of equities reduced by the risk-free rate of return. The CAPM specifically accounts for differences in systematic risk (i.e., market risk as measured by the beta) between an individual firm and group of firms and the entire market of equities. As such, to calculate the CAPM, it is necessary to employ firms with traded stocks. In this regard, I have performed a CAPM calculation for the Barometer Group. In contrast, my Risk Premium approach also considers industry- and company-specific factors because it is not limited to measuring just systematic risk. As a consequence, my Risk Premium approach is more comprehensive than the CAPM. In addition, the Risk Premium approach provides a better measure of the cost of equity because it is founded upon the yields on corporate bonds rather than Treasury bonds. Due to the disconnection of the yields on corporate and Treasury bonds, the Risk Premium approach is preferable at this time.

**Q. What betas have you considered in the CAPM?**

A. For my CAPM analysis, I initially considered the Value Line betas. As shown on page 1 of Schedule 10, the average beta is .68 for the Barometer Group.

**Q. What betas have you used in the CAPM determined cost of equity?**

A. The betas must be reflective of the financial risk associated with the ratesetting capital structure that is measured at book value. Therefore, Value Line betas cannot be used directly in the CAPM unless those betas are applied to a capital structure measured with market values. To develop a CAPM cost rate applicable to a book value capital structure, the Value Line betas have been unleveraged and releveraged for the common equity ratios using book values. This adjustment has been made with the formula.

$$\beta l = \beta u\ [1 + (1 - t)\ D/E + P/E]$$

where $\beta l$ = the leveraged beta, $\beta u$ = the unleveraged beta, $t$ = income tax rate, $D$ = debt ratio, $P$ = preferred stock ratio, and $E$ = common equity ratio. The betas published by Value Line have been calculated with the market price of stock and therefore are related to the market value capitalization. By using the formula shown above and the capital structure ratios measured at their market values, the beta would become .49 for the Barometer Group if it employed no leverage and was 100% equity financed. With the unleveraged beta as a base, I calculated the leveraged beta of .81 for the Barometer Group associated with the book value capital structure.

**Q. What risk-free rate have you used in the traditional CAPM?**

A. For reasons explained in Appendix F, I have employed the yields on long-term Treasury bonds using both historical and forecast data to match the longer-term horizon associated with the ratesetting process. As shown on pages 2 and 3 of Schedule 10, I have provided the historical yields on long-term Treasury bonds. For the twelve months ended December 2002, the average yield was 5.42% as shown on page 3 of that schedule. For the six- and three- months ended December 2002, the yields on long-term Treasury bonds were 5.15% and 5.08%, respectively. As shown on page 4 of Schedule 10, forecasts published by Blue Chip Financial Forecasts on January 1, 2003 indicate that the yields on long-term Treasury Bonds are expected to be in the range of 5.1% to 5.8% during the next six quarters. To conform with the use of historical and forecast data that I employ in my analysis, I have used a 5.25% risk-free rate of return for CAPM purposes.

**Q. What market premium have you used in the traditional CAPM?**

A. As discussed in Appendix H, the market premium is developed by averaging historical market performance (i.e., 7.0%) and with the Value Line forecasts (i.e., 12.68%). The resulting market premium is 9.84% (7.0% + 12.68% = 19.68% ÷ 2), which represents the average market premium using the historical SBBI data and the forecast by Value Line.

**Q. What CAPM result have you determined using the CAPM?**

A. Using the 5.25% risk-free rate of return, the leverage adjusted beta of .81 for the Barometer Group, and the 9.84% market premium, the following result is indicated.

$$Rf \quad + \quad \beta \quad (Rm\text{-}Rf) \quad = \quad k$$

$$5.25\% \quad + \quad .81 \quad (9.84\%) \quad = \quad 13.22\%$$

**Q. What rate of return is indicated from the CAPM?**

A. The CAPM result is 13.22% for the Barometer Group. I should note that there would be an understatement of a firm's cost of equity with the CAPM unless the size of a firm is considered. That is to say, as the size of a firm decreases, its risk, and hence its required return increases. Moreover, in his discussion of the cost of capital, Professor Brigham has indicated that smaller firms have higher capital costs then otherwise similar larger firms (see Fundamentals of Financial Management, fifth edition, page 623). Also, the Fama/French study (see "The Cross-Section of Expected Stock Returns"; The Journal of Finance, June 1992) established that size of a firm helps explain stock returns. In an October 15, 1995 article in Public Utility Fortnightly, entitled Equity and the Small-Stock Effect, by Michael Annin it was demonstrated that the CAPM could understate the cost of equity significantly according to a company's size. Indeed, it was demonstrated in the SBBI Yearbook which indicated that the returns for stocks in lower deciles (i.e., smaller stocks) had returns in excess of those shown by the simple CAPM. In this regard, the Barometer Group had an average market capitalization of its equity of $1,087 million which would place it in the sixth decile according to the size of the companies traded on the NYSE, AMEX, and NASDAQ. Therefore, the Barometer Group must be viewed as a portfolio of low-cap companies consisting of those in the 6th through 8th deciles with market capitalization between $269 million and $1,115 million. This would indicate a size premium of 1.42%, increasing the CAPM result from 13.22% to 14.64%. Absent such an adjustment, the CAPM would understate the required return.

## COMPARABLE EARNINGS APPROACH

**Q. How have you applied the Comparable Earnings approach in this case?**

A. The technical aspects of my Comparable Earnings approach are set forth in Appendix I. In order to identify the appropriate return on equity for a public utility, it is necessary to analyze returns experienced by other firms within the context of the Comparable Earnings standard. The firms selected for the Comparable Earnings approach should be companies whose prices are not subject to cost-based price ceilings (i.e., non-regulated firms) so that circularity is avoided. Because regulated firms must compete with non-regulated firms in the capital markets, it is appropriate, if not necessary, to view the returns experienced by firms which operate in competitive markets. One must keep in mind that the rates of return for non-regulated firms represent results on book value actually achieved or expected to be achieved because the starting point of the calculation is the actual experience of companies that are not subject to rate regulation. The United States Supreme Court has held that:

> [T]he return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital. (F.P.C. v. Hope Natural Gas Co., 320 U.S. 591 (1944)).

Therefore, it is important to identify the returns earned by firms which compete for capital with a public utility. This can be accomplished by analyzing the returns for non-regulated firms which are subject to the competitive forces of the marketplace.

There are two avenues available to implement the Comparable Earnings approach. One method would involve the selection of another industry (or industries) with comparable risks to the public utility in question, and the results for all companies within that industry would serve as a benchmark. The second approach requires the selection of parameters which represent similar risk traits for the public utility and the comparable risk companies. Using this approach, the business lines of the comparable companies become unimportant. The latter approach is preferable with the further qualification that the comparable risk companies exclude regulated firms. As such, this approach to Comparable Earnings avoids the circular reasoning implicit in the use of the achieved earnings/book ratios of other regulated firms. Rather, it provides an indication of an earnings rate derived from non-regulated companies that are subject to competition in the marketplace and not rate regulation. Because regulation is a substitute for competitively-determined prices, the returns realized by non-regulated firms with comparable risks to a public utility provide useful insight into a fair rate of return. This is because returns realized by non-regulated firms have become increasingly relevant with the trend toward increased risk throughout the public utility business. Moreover, the rate of return for a regulated public utility must be competitive with returns available on investments in other enterprises having corresponding risks, especially in a more global economy.

To identify the comparable risk companies, the Value Line Investment Survey for Windows was used to screen for firms of comparable risks. The Value Line Investment Survey for Windows includes data on approximately 1600 firms. Excluded from the selection process were companies incorporated in foreign countries and master limited partnerships (MLPs).

**Q. How have you implemented the Comparable Earnings approach?**

A. In order to implement the Comparable Earnings approach, non-regulated companies were selected from the Value Line Investment Survey for Windows which have six categories (see Appendix I for definitions) of comparability designed to reflect the risk of the Barometer Group. These screening criteria were used to establish a range as defined by the rankings of the component companies in the Barometer Group. The items considered were: Timeliness Rank, Safety Ranking, Financial Strength, Price Stability, Value Line betas, and Technical Rank. The identities of companies comprising the Comparable Earnings group and their associated rankings within the ranges are identified on page 1 of Schedule 11 for the Barometer Group.

Value Line data was relied upon because it provides a comprehensive basis for evaluating the risks of the comparable firms. As to the returns calculated by Value Line for these companies, there is some downward bias in the figures shown on page 2 of Schedule 11 because Value Line computes the returns on year-end rather than average book value. If average book values had been employed, the rates of return would have been slightly higher. Nevertheless, these are the returns considered by investors when taking positions in these stocks. Finally, because many of the comparability factors, as well as the published returns, are used by investors for selecting stocks, and to the extent that investors rely on the Value Line service to gauge their returns, it is, therefore, an appropriate database for measuring comparable return opportunities.

Q. **What data have you used in your Comparable Earnings analysis?**

A. I have used both historical realized returns and forecast returns for non-utility companies. As noted previously, I have not used returns for utility companies so as to avoid the circularity that arises from using regulatory influenced returns to determine a regulated return. It is appropriate to consider a relatively long measurement period in the Comparable Earnings approach in order to cover conditions over an entire business cycle. A ten-year period (5 historical years and 5 projected years) is sufficient[6] to cover an average business cycle. The results of the Comparable Earnings method can

6 For example, since 1854, there have been 30 business cycles having an average length of 51 months measured from trough to trough and 53 months measured from peak to peak. Hence, a 10-year measurement period in the Comparable Earnings approach is more than adequate to cover an average business cycle.

be applied directly to an original cost rate base because the nature of the analysis relates to book value. Hence, Comparable Earnings does not contain the potential misspecification contained in market models when prices and book values diverge significantly. The historical rate of return on book common equity was 13.8% using the median value as shown on page 2 of Schedule 11. The forecast rates of return as published by Value Line are shown by the 14.0% median values also provided on page 2 of Schedule 11.

**Q. What rate of return on common equity have you determined in this case using the Comparable Earnings approach?**

A. The average of the historical and forecast median rates of return is 13.90% (13.8% + 14.0% = 27.8% ÷ 2) and represents the Comparable Earnings result for this case.

## CREDIT QUALITY AND CONCLUSION

**Q. What are some of the important factors that influence credit quality?**

A. The Company must have the financial strength that will, at a minimum, permit it to maintain a financial profile that is commensurate with the requirements to obtain a solid investment grade bond rating. The Company should be given an opportunity to sustain its credit quality with a financial profile that at a minimum conforms with the standards for an A credit quality rating.

A variety of quantitative and qualitative measures must be considered when assessing the credit quality of an appropriate rate of return on common equity. In quantitative terms, two of the measures of credit quality considered by the bond rating agencies are debt leverage and pre-tax interest coverage. In the area of coverage, the rate of return on common equity represents a critical component because it is the equity return that provides the margin whereby an interest coverage multiple greater than one is realized.

**Q. Why is it important that a utility maintain strong credit quality?**

A. Strong credit quality is necessary to provide a utility with the highest degree of financial flexibility in order to attract capital on reasonable terms during all economic conditions. Customers also benefit from strong credit quality because the utility will be able to obtain lower financing costs that are passed on to customers in the form of a lower embedded cost of debt. For that reason, rates should be established that would allow the maintenance of a financial profile that would support a strong A bond rating which is the appropriate regulatory objective.

**Q. What credit quality measures are reflected in the rate of return that has been proposed by the Company in this case?**

A. Using a 39.225% composite state and federal income tax rate, Schedule 1 shows that the pre-tax coverage of interest expense would be 3.61 times assuming the Company could actually realize a 10.13% overall rate of return. The 3.61 times pre-tax interest coverage shown on Schedule 1 should be viewed in the context of the S&P credit quality rating criteria that I previously discussed. It is important to recognize that the benchmarks represent levels expected to be achieved, rather than the opportunity provided by the rate of return used in the ratesetting process. It is my opinion that the Company's rates should be established at a level that would provide the Company with an opportunity to attain a credit quality that is reflected on Schedule 1.

**Q. What is your conclusion concerning the Company's cost of equity?**

A. Based upon the application of a variety of methods and models described previously, it is my opinion that the reasonable rate of return on common equity is 12.18% for Boston Gas. This equity return is appropriate for Boston Gas given its risk characteristics. It is essential that the Department employ a variety of techniques to measure the Company's cost of equity because of the limitations/infirmities that are inherent in each method. In conclusion, the Company should be allowed a 12.18% rate of return on common equity so that it can compete in the capital markets, maintain reasonable credit quality, and be adequately compensated for its business risk.

**Q. Does this conclude your Prepared Direct Testimony?**

A. Yes.